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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ERIC J. STRANG

Appeal 2009-010751
Application 10/673,506[1]
Technology Center 2800

Before MAHSHID D. SAADAT, MARC S. HOFF, and CARLA M. KRIVAK, *Administrative Patent Judges*.

HOFF, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from a Final Rejection of claims 1-62 and 66-68.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

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[1] The real party in interest is Tokyo Electron Limited.
[2] Claims 63-65 and 69 have been cancelled.

Appellant's invention concerns a method for analyzing a process performed by a semiconductor processing tool. A first principles simulation is performed, during the performance of the actual process, using input data and a first principles physical model relating to the semiconductor processing tool. The simulation result is produced in a shorter time frame than the actual processing being performed. The simulation result obtained during the performance of the actual process is then used to determine a fault in the process performed by the semiconductor processing tool (Spec. 3, 15).

Claim 1 is exemplary of the claims on appeal:

1. A method for analyzing a process performed by a semiconductor processing tool, comprising:

inputting process data relating to an actual process being performed by the semiconductor processing tool;

inputting a first principles physical model including a set of computer-encoded differential equations, the first principles physical model describing at least one of a basic physical or chemical attribute of the semiconductor processing tool;

performing a first principles simulation for the actual process being performed during performance of the actual process using the physical model to provide a first principles simulation result in accordance with the process data relating to the actual process being performed in order to simulate the actual process being performed, said first principles simulation result being produced in a time frame shorter in time than the actual process being performed; and

using the first principles simulation result obtained during the performance of the actual process to determine a fault in the actual process being performed by the semiconductor processing tool.

The Examiner relies upon the following prior art in rejecting the claims on appeal:

Kee	US 5,583,780	Dec. 10, 1996
Sonderman	US 6,802,045 B1	Oct. 05, 2004 (filed Apr. 19, 2001)
Fatke	US 2005/0016947 A1	Jan. 27, 2005 (filed Mar. 25, 2002)

Claim 66 stands rejected under 35 U.S.C. § 101 as being directed to nonstatutory subject matter.

Claims 1-25, 32-56, and 63-68[3] stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sonderman in view of Kee.

Claims 26-31 and 57-62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sonderman in view of Kee and Fatke.

Throughout this decision, we make reference to the Appeal Brief ("App. Br.," filed July 21, 2008), the Reply Brief ("Reply Br.," filed May 18, 2009), and the Examiner's Answer ("Ans.," mailed October 31, 2008) for their respective details.

[3] Claim 69 is listed in the Brief as being rejected under § 103, but claim 69 has been cancelled.

ISSUES

Appellant argues, *inter alia*, that the Examiner's rejection is erroneous because Sonderman does not teach performing a first principles simulation for the actual process being performed *during performance of the actual process* (App. Br. 10, emphasis added).

With respect to the § 101 rejection of claim 66, Appellant argues that claim 66 provides a useful, concrete, and tangible result, and that by reciting a processor, the claim is tied to another statutory class, rendering the putative process claim patent-eligible (App. Br. 20-21).

Appellant's contentions, present us with the following issues:

1. Does Sonderman teach performing a first principles simulation for the actual process being performed during performance of the actual process, the first principles simulation result being produced in a time frame shorter in time than the actual process being performed?

2. Does Appellant's Specification define "computer readable medium" in a way that renders claim 66's recitation of such a medium nonstatutory?

FINDINGS OF FACT

Appellant's Specification

1. Appellant's Specification discloses that "[a] computer readable medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media.... Transmission media also

may also take the form of acoustic or light waves, such as those generated during radio wave and infrared data communications." Spec. ¶ [00103].

Sonderman

2. Sonderman teaches that "[i]n one embodiment the process control environment **180** receives input data from the simulation environment **210**, which is then used to control the operation of the manufacturing environment **170**" (col. 4, ll. 52-55).

3. Sonderman further teaches that "[T]he manufacturing environment **170** can send metrology data results into the simulation environment **210**. The simulation environment **210** can then use the metrology data results and perform various tests and calculations to provide more accurate, modified control parameters to the process control environment **180**" (col. 4, l. 67 – col. 5, l. 6).

4. "In one embodiment the process control environment **180** utilizes the simulation data received from the simulation environment **210** in order to make control parameter adjustments or modifications for controlling manufacturing processes" (col. 5, ll. 43-47).

5. Sonderman teaches that, "[i]n other words, the system **100** sends operation data, control parameter data, simulation data, and the like, to the defined models so that the defined models can perform a simulation as if an actual manufacturing process were being performed" (col. 7, ll. 13-18).

PRINCIPLES OF LAW

> Section 103(a) forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

KSR Int'l Co. v. Teleflex, Inc., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 550 U.S. at 407, ("While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.")

A transitory, propagating signal is not a "process, machine, manufacture, or composition of matter." Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter. *In re Nuijten*, 500 F.3d 1346, 1357 (Fed. Cir. 2007) *reh'g en banc denied*, 515 F.3d 1361 (Fed. Cir. 2008).

"If a claim covers material not found in any of the four statutory categories, that claim falls outside the plainly expressed scope of § 101 even if the subject matter is otherwise new and useful." *Id.* at 1354.

ANALYSIS

§ 103 REJECTIONS

The independent claims under appeal (claims 1, 32, and 66) each recite performing a first principles simulation for the actual process being performed during performance of the actual process.

The Examiner finds that Sonderman teaches performing a first principles simulation for the actual process being performed during performance of the actual process (Ans. 4, citing Sonderman col. 5, ll. 10-67 and col. 7, ll. 1-20). The Examiner further finds, in the Response to Argument section of the Examiner's Answer, that Figure 1 illustrates such performance of a simulation during performance of the actual process (Ans. 14). According to the Examiner, the combination of Figures 1-3 of Sonderman teaches that "there would have a loop back process from performing an actual process to simulation environment because the actual process data must be used by the simulation environment" (*id.*).

We do not agree with the Examiner's characterization of Sonderman as teaching simultaneous simulation and processing. Sonderman consistently discloses performing simulation, *then* applying the simulation results to modify an actual process. For example, in describing Figures 1 and 2 together, "[i]n one embodiment the process control environment **180** receives input data from the simulation environment **210**, which is then used to control the operation of the manufacturing environment **170**" (FF 2). "[T]he manufacturing environment **170** can send metrology data results into

the simulation environment **210**. The simulation environment **210** can then use the metrology data results and perform various tests and calculations to provide more accurate, modified control parameters to the process control environment **180**" (FF 3).

Sonderman further discloses that "[i]n one embodiment the process control environment **180** utilizes the simulation data received from the simulation environment **210** in order to make control parameter adjustments or modifications for controlling manufacturing processes" (FF 4). "In other words, the system **100** sends operation data, control parameter data, simulation data, and the like, to the defined models so that the defined models can perform a simulation *as if* an actual manufacturing process were being performed" (FF 5, emphasis added). Even Sonderman's disclosure that "process control interface **350** also allows the simulation environment **210** to receive manufacturing data from the manufacturing environment **170**, which can be used by the simulation environment **210** to perform feedback corrections during the manufacturing of semiconductor wafers" (col. 5, ll. 22-27) is not a clear teaching that simulation and processing (i.e., manufacturing) are simultaneous.

We therefore find that Sonderman teaches *sequentially* performing simulation of a process, followed by the actual performance of the process. We have reviewed Kee and Fatke, and find that they do not remedy the deficiency of Sonderman with respect to the appealed claims.

Because the combination of Sonderman and Kee does not teach all the limitations of independent claims 1 and 32, we conclude that the Examiner erred in rejecting claims 1-62 and 66-68 under § 103. We will not sustain the rejection.

§ 101 REJECTION

Claim 66 recites a "computer readable medium containing program instructions for execution on a processor." Appellant's Specification defines its "computer readable medium" as including a transmission medium, which in turn "may also take the form of acoustic or light waves, such as those generated during radio wave and infrared data communications" (FF 1). We find that acoustic or light waves amount to a transitory, propagating signal, which is not a process, machine, manufacture, or composition of matter, according to Federal Circuit law. *Nuijten*, 500 F.3d at 1357. Moreover, "[a] claim that covers both statutory and non-statutory embodiments . . . embraces subject matter that is not eligible for patent protection and therefore is directed to non-statutory subject matter." U.S. Patent & Trademark Office, *Interim Examination Instructions for Evaluating Subject Matter Eligibility Under 35 U.S.C. §101*, at 2 (Aug. 2009), *available at* http://www.uspto.gov/patents/law/comments/2009-08-25_interim_101_instructions.pdf. See also *Subject Matter Eligibility of Computer Readable Media*, 1351 OFFICIAL GAZETTE U.S. PAT. & TRADEMARK OFF. 212 (Feb. 23, 2010) ("A claim drawn to such a computer readable medium that covers both transitory and non-transitory

embodiments may be amended to narrow the claim to cover only statutory embodiments to avoid a rejection under 35 U.S.C. § 101 by adding the limitation "non-transitory" to the claim. Cf. Animals - Patentability, 1077 Off. Gaz. Pat. Office 24 (April 21, 1987) (suggesting that applicants add the limitation "non-human" to a claim covering a multi-cellular organism to avoid a rejection under 35 U.S.C. § 101)." Claim 66 therefore covers material not found in any of the four statutory categories, and falls outside the plainly expressed scope of § 101. *Nuijten*, 500 F.3d at 1354.

We therefore conclude that the Examiner did not err in rejecting claim 66 under § 101 as being directed to nonstatutory subject matter, and we will sustain the Examiner's rejection.

CONCLUSIONS

1. Sonderman does not teach performing a first principles simulation for the actual process being performed during performance of the actual process, the first principles simulation result being produced in a time frame shorter in time than the actual process being performed.

2. Appellant's Specification defines "computer readable medium" in a way that renders claim 66's recitation of such a medium nonstatutory.

ORDER

The Examiner's rejection of claims 1-62, 67, and 68 is reversed. The Examiner's rejection of claim 66 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

rwk